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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT Application of
Nilsson

Group Art Unit: 1764

U.S. Serial No. 09/937,659

Examiner: Duong

Filed: October 1, 2004

Att. Docket No.: 625-9937

For: PROCESS FOR COOLING SOLID AND GASEOUS MATERIAL DURIN GASIFICATION OF SPENT LIQUOR

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November 3, 2006

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal from the final rejection of claims 11-24 of the subject application.

(i). Real Party in Interest:

This application is assigned to Chemrec Aktiebolag.

(ii). Related Appeals and Interferences:

There are **no** other prior or pending appeals, interferences or judicial proceedings known to Appellant, the Appellant's legal representative, or assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(iii). Status of Claims:

Claims 11-24 are pending in this application.

Claims 1-10 are canceled.

Claims 11-24 stand rejected.

The rejection of claims 11-24 is appealed.

Please see the Appendix for a copy of the claims under appeal.

(iv). Status of any Amendment Filed Subsequent to Final Rejection:

No amendments have been filed subsequent to final rejection.

A Notice of Appeal was filed on 31 August 2006 along with the appropriate fee.

(v). Summary of Claimed Subject Matter:

Independent claim 11 provides a process for the recovery of chemicals and energy from spent liquor obtained in a chemical pulping process comprising:

gasifying the spent liquor under sub-stoichiometric conditions in a burner to produce partly at least one phase of solid and/or fused material and partly at least one phase of a flammable gaseous material;

removing the phases from the burner and then cooling the phases by direct contact with a cooling medium; and

separating the phase of solid and/or fused material from the phase of flammable gaseous material such that the solid and/or fused material is dissolved and collected as a product liquid in a product liquid receiver, wherein the cooling medium consists of an essentially water-free cooling medium, which cooling medium is at least partly vaporized or cracked, whereby the vaporized/cracked cooling medium is drawn off together with the phase of flammable gaseous material, and the cooling medium after

vaporizing/cracking increases the calorific value of the flammable gaseous material relative to the calorific value of the flammable gaseous material without addition of the essentially water-free cooling medium. Basis for this claim can be found in the originally filed application including at page 2, line 36 through page 3, line 6 and 5, lines 9 through page 6, line 14. The essentially water-free cooling is shown in Fig. 1 at reference No. 9 and the burner is shown at reference No. 5.

(vi). Grounds of Rejection to be Reviewed on Appeal:

I. Whether claims 11-23 are patentable under 35 U.S.C. § 103(a) over U.S. Patent No. 6,062,547 (Nilsson) in view of U.S. Patent No. 4,773,918 (Kohl).

(vii). Argument:

I. Claims 11-24 are patentable under 35 U.S.C. § 103(a) over Nilsson in view of Kohl.

The claimed invention recites the step of:

"removing the phases from the burner and then cooling the phases by direct contact with a cooling medium ...

"wherein the cooling medium consists of an essentially water-free cooling medium, which cooling medium is at least partly vaporized or cracked, whereby the vaporized/cracked cooling medium is drawn off together with the phase of flammable gaseous material, and the cooling medium after vaporizing/cracking increases the calorific value of the flammable gaseous material relative to the calorific value of the flammable gaseous material without addition of the essentially water-free cooling medium."

There is No Prima Facie Case of Obviousness:

The claimed invention requires using an essentially water-free cooling medium to cool the "phases" (solid or fused, and gaseous phases), not merely a separated gasseous (a single phase), and that the cooling medium is at least partially vaporized or cracked by cooling the phases leaving the burner. As discussed below, none of the cited references, alone or in combination, teach or suggest cooling "phases" leaving the burner with an essentially water-free cooling medium, and the Examiner has provided no arguments in response. The Examiner only alleges that the references teach cooling a single phase (product gas). Thus, the Examiner has not made a prima facie case of obviousness. For this reason alone, the Section 103 rejection should be withdrawn.

Unexpected Results:

Appellant respectfully submits that the Examiner has not properly considered the unexpected results of the claimed invention compared to the cited references. See page 2, lines 19-25 of the present specification, which teaches that water cooling undesirably results in carbonate formation. The present invention solves this problem by using essentially-water free cooling. As discussed below, Nilsson and Kohl both teach to cool the phases leaving the burner with water. Thus, the combination of cited references does not teach or suggest a solution to the problem of carbonation of the phases leaving the burner. For this reason alone, any prima facie case of obviousness raised by the Examiner is fully rebutted and the Section 103 rejection should be withdrawn.

Response to Examiner's Arguments:

The Examiner admits that Nilsson does not teach using the claimed essentially water-free cooling medium. See page 3, lines 4-5 of the Final Office Action mailed 4

April 2006. The Examiner argues that Kohl inherently teaches to use a water-free cooling medium. This simply is not true.

The specification of Kohl clearly teaches to cool the "phases" leaving the burner with water. See Fig. 2 of Kohl, where water 52 is used to cool the melt phase 48 leaving the burner 46. Kohl clearly teaches to cool the "phases" leaving the burner with water.

Since Kohl teaches to cool the "phases" leaving the burner with water and Nilsson teaches to cool the "phases" leaving the burner with water, the combination of references must also teach to cool the phases leaving the burner with water. In contrast, the claimed invention requires cooling the phases leaving the burner with an essentially water-free cooling medium. For this reason alone, the Section 103 rejection should be withdrawn.

Appellant respectfully submits that the Examiner is improperly confusing the "product gas" of Kohl with the "phases" leaving the burner of Kohl as follows:

> Kohl '918 teaches the essentially water-free cooling medium or gaseous fuel (oil, petroleum coke, natural gas, volatile hydrocarbons) can be added directly to the **product gas** to raise its heating value (Col. 7, lines 48-55). Thus, it would have been obvious in view of Kohl '914 to one of ordinary skill in the art to modify the gasification process of Nilsson '547 with the cooling medium as taught by Kohl '918 in order to increase the heating value of the **product gas** (flammable gaseous material). Note, the properties of gaseous fuels of Kohl '918 have a much lower temperature than the **product gas** (flammable gaseous material); thus the gaseous fuels act as a cooling medium, which inherently cool the **product gas**. [Page 3 of Final Office Action mailed 4 April 2006. (Emphasis added.)]

See Fig. 1 of Kohl, which clearly shows that the "product gas" is the final product that is produced at 89. The **product gas** to which hydrocarcbons are added (Column 7, lines 48-65 of Kohl) is not the **hot phases leaving the burner**, but rather the product gas leaving the reactor at 89.

The phases leaving the burner 46 of Kohl, include the product gas through 68 and the melt leaving through 48. As stated above, the melt is clearly cooled using water at 52. The product gas is cooled twice with a condensor, at 68, 72 and 70 and then again at 60, 62 and 64, in Fig. 2 of Kohl. Thus, Kohl does not teach cooling the "phases" leaving the burner with an essentially water-free medium.

Appellant respectfully submits that the Examiner's argument that the "properties of the gaseous fuels of Kohl '918 have a much lower temperature than the product gas" is not supported by the teachings of Kohl. As discussed above, the product gas is cooled twice before the hydrocarbons are added thereto. Thus, there is no disclosure in Kohl to support the Examiner's position.

Column 6, lines 55-58 of Kohl teaches that water vapor travels through conduit 58 to contact the product gas and then the mixture of water vapor and product gas is cooled in the condenser at 60. Thus, the water vapor is used to cool the product gas in the condenser 60 of Kohl.

The Examiner argues in the Final Office Action that:

> Applicant's arguments filed January 17, 2006 have been fully considered but they are not persuasive. (1) Applicant argued "Kohl clearly shows that the "product gas" is the final product produced at 89. The product gas is not the hot gas leaving the burner." Examiner respectfully disagrees. Kohl clearly teaches a conduit 68 for the removal of hot product gases from the reactor 10 (Col. 6, lines 59-63). Note, the product gas leaving the absorber 76 is the "purified" product gas (product gas free from acid gases, H2S).

Appellant respectfully disagrees with the Examiner that the product gas leaves the reactor 10 at 68. Fig. 2 of Kohl clearly shows that the "product gas" (clearly labled) leaves the reactor at 89. Fig. 2 also clearly shows that the product gas is cooled twice, first at 68, 70 and 72, and then again at 60, 62 and 64 before leaving the reactor at 89. Thus, the product gas is cool, and adding a hydrocarbon to a cool gas to increase calorific value cannot be considered cooling.

Nevertheless, even if the Examiner is correct (Appellant respectfully submits he is not) that the product gas leaves the reactor 10 at 68, and a hydrocarbon is added to the product gas at 68, this still does not teach the claimed invention. The claimed invention cools the "phases" leaving the burner and then the gaseous material is separated from the other phases leaving the burner. In other words, the claimed invention not only cools the gaseous material phase with an essentially water-free cooling medium, but also a solid or fused phase as well. In contrast, Kohl clearly teaches that the other phase leaving the reactor (burner), the melt phase 48, is cooled using water 52. Thus, Kohl does not teach cooling the "phases" leaving the reactor with an essentially water-free cooling medium.

The Examiner also argues in the Final Office Action that:

> (2) Applicant also argued that "the Examiner admits that both Kohl and Nilsson teach cooling the hot gas with water. Kohl does not teach cooling the hot gas with hydrocarbons. The Examiner admits that the cooling stage is "much farther downstream" of the gasification zone. The Examiner also admits that Kohl teaches adding hydrocarbons to the gasification zone, not the cooling zone. These admissions further demonstrate that Kohl simply does not teach using hydrocarbons in the cooling stage." Examiner respectfully disagrees. It is submitted that the Kohl discloses the essentially waterfree cooling medium (Col. 7, lines 98-55) can be added to the gasification zone or product gas (product gas leaving the gasification zone at conduit 66) to raise the heating value. It is noted that the features upon which applicant relies (i.e., Kohl simply does not teach using hydrocarbons in the cooling stage) are not recited in the rejected claim(s). Claim I merely recites "removing the phases from the burner and then cooling the phases by direct contact with a cooling medium." Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). It is submitted that both Nilsson and Kohl disclose the phases are removed from the burner and cooling the phase by direct contact with a cooling medium. The only difference between the two references is that the Kohl allows cooling the phase by using water-free cooling medium.

Appellant respectfully submits that claim 11 does not "merely recite 'removing the phases' from the burner and then cooling the phases by direct contact with a cooling medium.'" The Examiner improperly ignores the remaining language in claim 11, which recites "wherein the cooling medium consists of an essentially water-free cooling medium, which cooling medium is at least partly vaporized or cracked, whereby the vaporized/cracked cooling medium is drawn off together with the phase of flammable gaseous material, and the cooling medium after vaporizing/cracking increases the calorific value of the flammable gaseous material relative to the calorific value of the flammable gaseous material without addition of the essentially water-free cooling medium."

Furthermore, Appellant has read no limitations from the specification into claim 11. Rather, Appellant only relies upon actual recited language in claim 11.

Appellant further respectfully submits that the Examiner is improperly ignoring claim language by stating "[i]t is submitted that both Nilsson and Kohl disclose the phases are removed from the burner and cooling **the phase** by direct contact with a cooling medium." (Emphasis added.) Claim 11 does not recite only cooling one phase, i.e. "the phase" as stated by the Examiner. Claim 11 cools "the phases" leaving the burner, and then the product gas is separated from the other phases.

Kohl simply does not teach or suggest using the hydrocarbons to cool the phases leaving the burner. The Examiner argues that "Kohl discloses the essentially waterfree cooling medium (Col. 7, lines 98-55) can be added to the gasification zone or product gas (product gas leaving the gasification zone at conduit 66) to raise the heating value." First, there is no teaching in Kohl of adding the hydrocarbons to the hot gas in conduit 66. Column 6, lines 59-66 of Kohl clearly teaches that the "gas **outlet** conduit 66" is for transferring the hot gas to the steam generator 68. An "outlet" is not an inlet. Fig. 2 confirms that there simply is no inlet for the conduit 66 for introducing hydrocarbons. Thus, Appellant respectfully submits that the Examiner's argument of

using outlet conduit 66 as an inlet for hydrocarbons is simply not supported by the disclosure of Kohl.

Kohl clearly teaches only adding the hydrocarbons to the cooled product gas after it leaves the reactor at 89, and after being twice cooled, as shown in Fig. 2 and discussed above.

Kohl, teaches away from the claimed invention by adding the hydrocarbons to the gasification zone (burner). Adding hydrocarbons to the burner will result in the hydrocarbon being **BURNED** (combusted) in the burner. When hydrocarbons are burned the result is more heat, **not** cooling. Thus, Kohl cannot inherently teach that by burning hydrocarbons in the burner results in cooling the hot gas rising above the burner, since this would violate well-known laws of thermodynamics.

Since both Kohl and Nilsson only teach cooling the phases leaving the burner using water, the combination of these references can only teach using water for such cooling. For this reason alone, the Section 103 rejection should be withdrawn.

Conclusion

In view of the lack of *prima facie* case of obviousness, the many differences between the claimed invention and the cited references, and the unexpected advantages of the claimed invention, it is believed that this application clearly and patentably distinguishes over the combination of the cited references and is in proper condition for allowance. Accordingly, Appellant respectfully request that the Board allow claims 11-24 over the cited references.

Respectfully submitted,
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(viii) Claims Appendix:

Claims 1-10 (Cancelled)

11. (Previously Presented) Process for the recovery of chemicals and energy from spent liquor obtained in a chemical pulping process comprising:

gasifying the spent liquor under sub-stoichiometric conditions in a burner to produce partly at least one phase of solid and/or fused material and partly at least one phase of a flammable gaseous material;

removing the phases from the burner and then cooling the phases by direct contact with a cooling medium; and

separating the phase of solid and/or fused material from the phase of flammable gaseous material such that the solid and/or fused material is dissolved and collected as a product liquid in a product liquid receiver, wherein the cooling medium consists of an essentially water-free cooling medium, which cooling medium is at least partly vaporized or cracked, whereby the vaporized/cracked cooling medium is drawn off together with the phase of flammable gaseous material, and the cooling medium after vaporizing/cracking increases the calorific value of the flammable gaseous material relative to the calorific value of the flammable gaseous material without addition of the essentially water-free cooling medium.

12. (Previously Presented) Process according to claim 11, wherein the cooling medium consists essentially of a liquified gas.

13. (Previously Presented) Process according to claim 11, wherein the cooling medium consists essentially of at least one selected from the group consisting of nitrogen, methane, propane and other hydrocarbons which are gaseous at NTP.

14. (Previously Presented) Process according to claim 11, wherein the cooling medium consists essentially of an organic liquid.

15. (Previously Presented) Process according to claim 11, wherein the cooling medium consists essentially of at least one selected from the group consisting of turpentine, tall oil, methanol and other alcohols which are liquids at NTP.

16. (Previously Presented) Process according to claim 11, wherein the cooling medium is recovered in the chemical pulping process or in a process for recovery of chemicals and energy from the spent liquor.

17. (Previously Presented) Process according to claim 11, wherein contact between the flammable gaseous material and the product liquid is avoided.

18. (Previously Presented) Process according to claim 11, wherein the cooling medium is sprayed into the mixture of solid and/or fused material and flammable gaseous material produced by the gasification

19. (Previously Presented) Process according to claim 11, wherein the cooling medium is sprayed into the mixture of solid and/or fused material and flammable gaseous material produced by the gasification in connection with the separation of the two phases from each other.

20. (Previously Presented) Process according to claim 11, wherein the cooling with the water-free cooling medium is carried out as a first stage in connection with the separation of the material phases produced by gasification from each other, whereafter further cooling is carried out in a second stage with a second cooling medium consisting essentially of water.

21. (Previously Presented) Process according to claim 11, further comprising maintaining an essentially even temperature in the reaction vessel corresponding to the gasification temperature, wherein the separation in the separation section forms a part of the total reaction vessel.

22. (Previously Presented) Process according to claim 21, further comprising adding an inert gas immediately above a product liquid receiver surface to form a protecting blanket over the product liquid receiver to prevent carbonation of boiling and splashing green liquor from the product liquid receiver.

23. (Previously Presented) Process according to claim 22, further comprising cooling by means of the product liquid.

24. (Previously Presented) Process according to claim 22, further comprising cooling by means of the product liquid in the form of a liquid film on a wall arranged directly before the solid/fused material reaches the product liquid receiver.

(ix) Evidence Appendix:

Not applicable.

(x) Related Proceedings Appendix:

Not applicable.